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PLANTING A SUGARBUSH

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This publication contains herbicide recommendations that are subject to change at any time. These recommendations are provided only as a guide. It is always the herbicide applicator's responsibility, by law, to read and follow all current label directions for the specific herbicide being used. Due to constantly changing lables and product registration, some of the recommendations given in this writing may no longer be legal by the time you read them. If any information in these recommendations disagrees with the label, the recommendation must be disregarded. No endorsement is intended for products mentioned, nor is criticism meant for products not mentioned. The author and the Ohio Cooperative Extension Service assume no liability resulting from the use of these recommendations.

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Planting a Sugarbush

The production of maple products is an important Ohio industry with close to 100,000 gallons of syrup produced annually. Production requires the collection and evaporation of enough maple sap to produce syrup with a sugar content of 66 percent. On the average, sugar maple sap is about 2 percent sugar and the evaporation process requires 43 gallons of sap to produce 1 gallon of syrup.

Planting provides the opportunity to develop a sugarbush with a higher average sap sugar content. For example, the "sweet" sugar maples developed at the Ohio Agricultural Research and Development Center and distributed by the Ohio Department of Natural Resources Forestry Division should average at least 4 percent sap sugar. Twenty-two gallons or less of sap will be needed from these trees to produce a gallon of syrup. This represents considerable economic savings and greater profit, since less sap will need to be collected, and less labor, time and fuel will be used to evaporate the sap to produce a gallon of syrup.

Other advantages to planting a sugarbush include being able to select the sugarbush site and early control of stand density and tree crown size and form. To successfully develop a productive sugarbush from seedlings, they must be properly planted and maintained on suitable sites.

Site Selection

Sugar maples grow naturally on a wide variety of sites, but sugarbush plantings should be done only on the better sugar maple sites. Such a site would be a level to gently sloping area containing deep, moist, well-drained soils in the loamy sand to silt loam texture range. Ideally, depth to permanent water table or bedrock should be at least 36 inches. The pH should fall between 5.5 and 7.0, preferably between 6.0 and 6.5.

Where slopes greater than 10 to 15 percent are present, south and southwest facing slopes should generally be avoided because of droughtiness. Low-lying areas that act as frost pockets should also be avoided as sugar maple seedling are quite frost sensitive. Frost damage results in lost growth and multiple leaders requiring additional pruning.

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Site Preparation and Weed Control

Before planting, undesirable trees and shrubs on the planting area should be killed and/or removed using appropriate methods. If the undesirable woody vegetation is not removed it may interfere with the growth and development of the maple seedlings and be more difficult to remove as the maple plantation matures.

Control of broadleaf weeds and grasses around the base of the seedlings for two to five years following planting is essential for successful establishment. Initially weeds should be controlled in a 3- to 4-foot diameter area around the base of each seedling or a 3-foot wide strip along the planted rows of trees. As the trees grow this area should be enlarged so that it remains as wide as the crowns of the trees. The exact length of time will depend on the type and intensity of weed competition and the rate of seedling growth. For good survival and early growth, weed control should be continued at least until the tree crowns are well above the surrounding weeds. Control beyond this time will be beneficial but is less critical. Weeds can be controlled by several methods:

- A **residual herbicide** labelled for use on maples, such as simazine, can be used to control the weeds during the spring and early summer. Follow all label instructions. If spraying the herbicide, be sure to calibrate the sprayer. If you are not experienced in spraying herbicides at a specified rate, consider using a granular herbicide, such as *Princep 4G* (a brand of simazine). Obtaining the correct application rate is usually easier with a granular herbicide than with a sprayed material.

- **Mulches**, such as hardwood, pine and cypress bark, and sawdust can be used to supress or eliminate weeds around the base of the seedlings. Materials which could substantially alter the soil pH, such as limestone, and those that might attract animal pests, such as straw, should be avoided. Sugar maples have also been successfully grown using 4-mil black polyetheylene (plastic) sheeting as a mulch material.

- **Shallow cultivation**, such as hoeing or rototilling, may also be used to control weeds. Cultivation should not be much deeper than 1 to 1 1/2 inches or valuable roots will be damaged.

The use of an herbicide along with mulching may provide the greatest benefits, including good weed control and minimization of frost heaving.

Residual herbicides and mulches are both usually more effective when applied to ground treated the previous August or early September with a foliar herbicide, such as *Roundup*, to kill the weeds. Again, follow the label recommendations for non-cropland to control the specific weeds present. Similarly, if the planting and application of residual herbicide or mulch cannot be done in the spring until after the weeds are actively growing and taller than about 1 1/2 inches, the use of a foliar herbicide such as *Roundup* prior to planting will substantially improve the effectiveness of the residual herbicide or mulch.

Mowing in the plantation is a matter of personal preference. Mowing between the trees several times during the growing season will produce a more attractive plantation, reduce the fire hazard

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from cured weed tops in the fall, facilitate the movement of people and equipment around the plantation, and may reduce small animal damage. Mowing may, however, attract deer into the plantation resulting in seedling damage unless the trees are protected.

To facilitate early weed control and protect from wildlife, some growers have planted the seedlings in a garden until they reach a height of 3 to 5 feet and then transplanted them to the field. If this is done, transplanting may require substantial time and some seedling growth may be lost due to transplant shock.

Seedling Care

Sugar maple seedlings are packaged and shipped in Kraft-paper bags. They can be stored in these bags for 3 to 4 days. Bags containing seedlings should be kept moist and in a cool shaded area.

If seedlings are to be held for a longer period of time before planting they should usually be heeled-in (Figure 1). To heel-in seedlings, dig a trench in the soil, with one side sloping, deep enough to hold the seedling roots. Lay the seedlings with their roots spread along the sloping side of the trench. Return the soil to the trench, packing it well around the roots (as well as if planting). Seedlings stored in this manner can be kept for several weeks, but should be removed and planted before their leaves begin to come out.

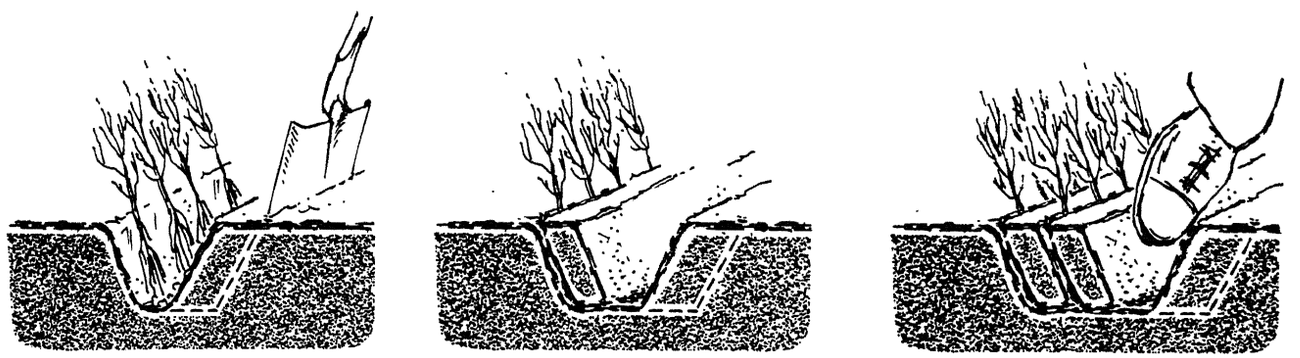

Figure 1. To heel-in seedlings, dig a trench deep enough to hold seedling roots; spread roots against one side of the trench; and return soil to the trench, packing it tightly around the roots.

When removing heeled-in seedlings, do not pull or yank them out of the soil or damage may be done to the roots. If the seedlings are tight in the soil, drive a tiling spade or planting shovel into the ground under the sloping side of the trench and gently lift/pry upwards.

When seedlings are being handled prior to and during planting, the roots must be kept moist. This is best done by keeping moist moss around the roots and keeping the seedlings shaded. Do not

store sugar maple seedlings in a container of water. The roots of most tree seedlings can be severely damaged by extended submersion in water.

Layout and Planting

When the maples have grown to 18 inches in diameter, there should be approximately 40 trees per acre in the sugarbush spaced approximately 33 feet apart. However, more than 40 trees per acre should be planted in order to have a choice of croptrees and to supress unwanted vegetation while the stand develops. Three initial seedling spacings, 8' x 8', 11' x 11', and 16 1/2' x 16 1/2' offer somewhat different options, as shown in Table 1.

Unless there are good reasons to choose the wider or narrower spacing, the 11' x 11' spacing should probably be selected. It provides an adequate number of trees from which to choose the final croptrees, the establishment costs per acre are much less than the narrower spacing, and it elminates the need to manage nurse trees. Selection of the wider spacing without interplanting will require long-term control of unwanted herbaceous and woody vegetation until the maple crowns close.

The location of planting rows and trees within rows should be carefully measured and laid out. Careful tree placement will make trees easier to locate, reduce damage and loss from mowing, and establish proper spacing for future thinning. Many techniques and aids can be used to achieve proper spacing such as poles cut or

Table 1. Initial Seedling Spacings

Spacing	Croptree Selection	Site Occupancy	Cost
8' x 8'	Plant 681 trees/acre. If final stand contains 42 trees/acre, there will be 1 final croptree for every 16 trees planted.	Seedlings will occupy site relatively quickly, supressing other vegetation & acting as nurse trees to each other.	Relatively expensive to plant 681 "sweet" trees/acre.
11' x 11'	Plant 360 trees/acre. If final stand contains 40 trees/acre, there will be 1 final croptree for every 9 trees planted.	Site occupancy intermediate.	Cost intermediate.
16 1/2' x 16 1/2'	Plant 160 trees/acre. If final stand contains 40 trees/acre, there will be 1 final croptree for every 4 trees planted.	Slow site occupancy. Recommendation often to interplant relatively fast growing species such as black alder or larch to act as nurse trees & help supress undesirable vegetation. The nurse trees are the first removed when stand is thinned.	Least expensive to establish.

marked to the spacing length, rope with knots or fingernail polish marks at spacing intervals, and survey flags to mark rows or planting locations. Sight down and along rows and across diagonals to straighten rows.

To avoid frost heaving, seedlings should generally be planted in the spring. Only healthy, vigorous, well-formed seedlings should be planted. Seedlings which are too small, have insufficient root systems, are poorly formed, are damaged or show signs of insect or disease should be discarded. This grading of the seedling can be done at any time but is usually done at the time of planting.

For best survival and growth, sugar maple seedlings should be planted in a hole with a cone of soil in the center over which the roots are draped (Figure 2). This method places the roots in the most natural position, minimizes root damage, and most effectively establishes root-soil contact in the largest volume of soil.

The hole can be dug with a shovel, spade, posthole digger or auger. It sould be slightly deeper than the length of the tree roots and slightly wider than the root spread. A cone of soil is firmly piled in the center of the hole so that when the tree is placed on the soil cone with its roots draping down, it is in the ground at the same depth it grew in the nursery. The original soil line can be seen on the seedlings by looking for changes in the texture and color of the seedlings' bark. The hole is then refilled with the same soil that was removed, packing the soil firmly as it is returned.

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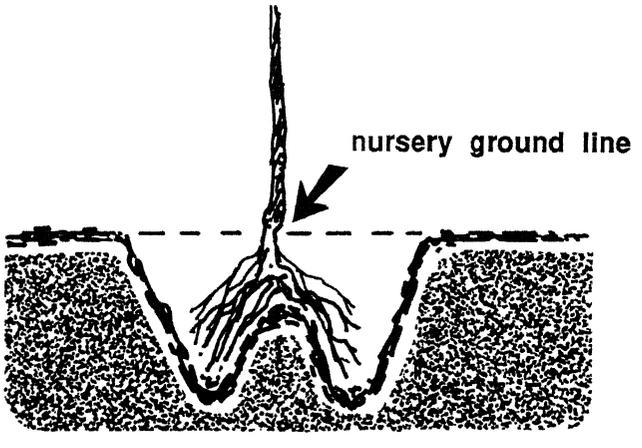

Figure 2. Seedlings should be planted at the same depth they grew in the nursery, with roots draped down over a cone of soil placed in the center of the planting hole.

If water is available, several gallons poured on the seedling after planting will help settle the soil around the roots. Do not water the seedling until the hole has been completely refilled with soil.

Soils on the area to be planted should be tested the year before planting to determine fertilizer and/ or lime needs.

Fertilization

When possible, soils on the area to be planted should be tested the year before planting to determine fertilizer and/or lime needs. Soil tests are available through the Ohio Cooperative Extension Service. Directions and materials are available from your county Extension office.

Lime and some nutrients, such as phosphorus, should be broadcast and worked into the soil, preferably during the fall prior to planting. Slow-release fertilizer pellets or packets may be used at planting time if desired. Neither liquid nor dry fertilizer should be surface applied or incorporated into the soil the first year following planting.

After the first year, if fertilization is needed, annual application of 3 to 4 pounds per 100 square feet of soil surface of a complete fertilizer with a N-P-K analysis of 10-10-10 may benefit the seedlings. If the fertilizer is applied in a circle around the base of the seedlings, refer to the rates in Table 2. If a different fertilizer analysis is used, adjust the application rate accordingly (e.g., half as much 20-20-20 would be needed).

Table 2. Fertilizer Application Rates - Circular Area

Diameter of Circular Fertilizer Application Area	Amount of 10-10-10 Fertilizer to Apply
3 feet	3 1/2 - 4 1/2 oz.
4 feet	6 - 8 oz.
5 feet	9 1/2 - 12 1/2 oz.
6 feet	13 1/2 - 18 oz.

Pruning

The form and shape of the seedlings should be examined each winter or early spring. The ultimate goal is to develop a tree that has a single trunk up to approximately 8 feet and then branches into a full crown. Multiple terminals should be removed, retaining the straightest, most central leader. Laterals with excessive growth should be cut back to keep the crown balanced. Terminal leaders that have been damaged or destroyed by deer or frost should be pruned back to a pair of lateral branches, with one of the laterals selected to become the new terminal leader and the other lateral removed or severely cut back. Lower branches generally need not be pruned unless they are damaged or interfere with spraying or mowing Figure 3).

Figure 3. A well formed young sugar maple tree.

When removing side branches, two rules should be followed. First, no more than 25 to 30 percent of the tree's crown should be removed in any one year. Rarely would a sugarbush maple seedling require this severe a pruning. Second, at least the upper 50 percent of the tree's trunk should contain live branches. Branches should be pruned at the branch collar, not flush against the trunk (Figure 4). Flush cuts take longer to heal. Prune sugar maples in the spring, after the sap has stopped running.

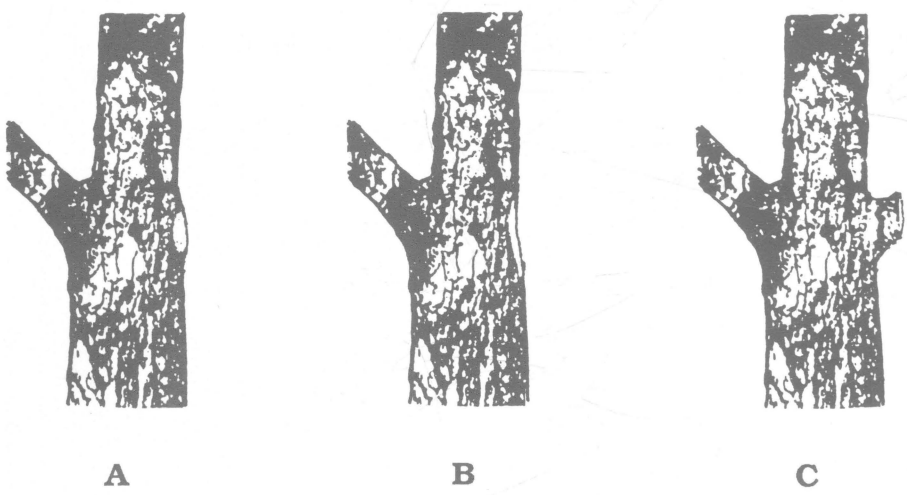

Figure 4. Branches should be pruned at the branch collar (A), not flush against the trunk (B) or further out the branch (C).

Protection

Sugar maple seedlings may be damaged or destroyed by the feeding habits of mice, rabbits or deer. Repellants and poisons have been used with varying degrees of success to protect seedlings. As an alternative, hardware cloth (1/4 inch mesh wire screen or hogwire) has effectively been used to protect sugar maple seedlings from wildlife damage. Initially, 30-inch high wire cylinders 8 to 10 inches in diameter are effective. However, if deer are a nuisance, they will feed on the tops of the trees as they grow out of the cylinders. In this situation, the wire cylinders must be replaced with taller cylinders. Deer may browse the tops of maples until the trees reach 6 feet tall.